Analyzing X-Ray Pulses from Stellar Cores

Answers:

GK Per

Power Spectrum (period confirmed with "period fold")
Frequency = 0.00285hz
Period = 351s

<u>If white dwarf</u>:

$g = (6.67 \times 10^{-11}Nm^2/kg^2)\ (2.0 \times 10^{30}kg)/(6.4 \times 10^6 m)^2 = 3.2 \times 10^6 m/s^2$

$a_c = (4\pi^2)\ (6.4 \times 10^6 m)/(351s)^2 = 2.1 \times 10^3 m/s^2$

a_c is less than g – GK Per could sustain this period if it were a white dwarf.

CEN X-3

Power Spectrum (period confirmed with "period fold")
Frequency = 0.208hz
Period = 4.8s

<u>If white dwarf</u>:

g is the same as above for GK Per = $3.2 \times 10^6 m/s^2$

$a_c = (4\pi^2)\ (6.4 \times 10^6 m)/(4.8s)^2 = 1.7 \times 10^7 m/s^2$

a_c is greater than g – Cen X-3 could not sustain this period if it were a white dwarf.

<u>If neutron star</u>:

$g = (6.67 \times 10^{-11}Nm^2/kg^2)\ (4.0 \times 10^{30}kg)/(10000m)^2 = 2.7 \times 10^{12} m/s^2$

$a_c = (4\pi^2)\ (10000m)/(4.8s)^2 = 1.7 \times 10^4 m/s^2$

a_c is less than g – Cen X-3 could sustain this period if it were a neutron star.